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BY

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OF THE PATHOLOGICAL SOCIETY OF BRUXELLES, ETC.

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TUBERCULAR CYSTITIS IN CHILDREN.¹

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ALTHOUGH tubercular cystitis is more frequently met with in young adults, a number of cases have been reported in children during the past few years. The genito-urinary organs in children being in a rudimentary state of development are invaded with difficulty by the infectious agent of tuberculosis, but this is not the only reason for the infrequency of reported cases. The symptomatology of tubercular cystitis in children is often so masked that the attention of the physician is not directed to the condition of the bladder, and I am of the opinion that if microscopical and bacteriological examination of the urine of children were more frequently resorted to urinary tuberculosis would be more often discovered in little patients.

All the causes attributed for the development of vesical tuberculosis in the adult may be applied to the child, such as acute infectious cystitis, the extension of an infection of the genital organs to the urinary tract, and explain why tuberculosis of the bladder is infrequent in children.

In young subjects, as is the case with adults, tubercular cystitis is either primary or secondary. When

¹ Read by invitation before the Danbury, Conn., Medical Society, November 2, 1898.

secondary it is more particularly due to tubercular lesions in the lung, but it may develop from a coxitis or adenitis. The primary form is seen in children born of apparently healthy parents, and its appearance is in the form of urinary disturbances that are often very misleading.

Our personal experience with tubercular infection of the bladder in children is limited to a single case which is here briefly reported.

Miss M. G., age eleven, was seen in October, 1896. She was the only child, born of healthy parents, both being alive, and had always enjoyed the best of hygienic surroundings. As a little child the patient had always been well excepting for measles at the age of four, and scarlet fever at seven. In neither of these affections had there been any renal or vesical complications, and the catheter had never been used. For the four months previous to our first visit the patient complained of a frequent desire to micturate, and this increased to such an extent that at our first visit she was going to the bath-room about every fifteen minutes. During the last six weeks the desire to pass water was complicated by a burning sensation at the time of micturition and following the act, and so intense that the child would cry out with pain. Strange to say, sleep was fairly good; every two or three hours there was a demand to empty the bladder. At the same time the appetite diminished and a yellow leucorrhea appeared. The bowels were regular. Exercise seemed to increase the pain, but riding appeared to have little effect. The tongue was clean, the pulse was 80, and at no time did the thermometer register above 37° C.

Examination of the thoracic and abdominal viscera was negative; the child did not cough; there were no night sweats, and there had never been a rhinitis nor

discharge from the ears. No enlarged lymphatic glands could be found, and a careful inspection of the throat showed that the tonsils and pharynx were in normal condition.

On account of the severe bladder symptoms we decided to examine the bladder and kidneys. Ether was given and after complete narcosis the abdomen was carefully explored, but no enlarged spleen or kidneys could be felt. The bladder could be palpated low down behind the pubis and its walls appeared rather thickened. A small Kelly's bladder speculum was then introduced. The trigonum was very hyperemic, the ureteral orifices were normal. Two small and superficial ulcerations, each about the size of a split pea, were seen; their borders were rather irregular, and they had a dirty yellow surface. The fundus of the bladder was somewhat hyperemic, although not very much so, and along the course of some of the vessels a few small pearly-colored points were present, having all the characters of tubercles. The urine was cloudy and slightly acid in reaction when voided, and muco-purulent deposit settled at the bottom of the tube after standing. This deposit was stained for tubercle bacilli and a few were found without much difficulty.

Four different samples of urine removed by a sterilized glass catheter into sterile tubes were inoculated into guinea-pigs; all four animals presented a well-marked tubercular peritonitis at necropsy a few weeks later.

The small ulcerations were cauterized five times with a 60-per-cent. solution of lactic acid at an interval of one week, and 20 cubic centimetres of an iodoform glycerine emulsion at 15 per cent. were injected, and allowed to be retained until expelled by the bladder, every four days for seven weeks.

The patient was placed upon cod-liver oil and a diet of milk, eggs and meat, and during the first ten days of treatment the following pill was taken at bedtime to relieve the dysuria :

R	Ext. belladon.	0.01
	Ext. hyoscyam.	} aa	0.03
	Ext. stramonii		
	Ext. valerian.	0.06
M.	F. pil.	D. tal. dos. No. XX.	Consp. pulv. liquirit.

At the end of four months the local condition was greatly improved, the symptoms were far less severe, and it was then thought best to send the patient to a proper climate. She went to the Bermudas and returned late in the spring.

In May, 1897, we again saw the patient, and cystoscopic examination failed to reveal any trace of the ulcerations other than two small star-shaped cicatrices. The fundus was still somewhat hyperemic, but no tubercles were observed. The general health was good, and the patient had gained about eleven pounds during her sojourn away.

Microscopical examination for tubercle bacilli was negative, and a guinea-pig inoculated with the urine remained well, and ten weeks later, when killed, showed no trace of any lesion of the peritoneum.

Here is a case, it seems to me, where the entrance of Koch's bacillus into the economy remains a mystery. The tonsils, which I consider a very frequent point of inoculation, were normal, and no trace of any other focus of the disease could be detected. What this child may develop in the future we cannot predict, but at least for the time being she is free from any process within the bladder.

If we consult the leading text-books, such as "Guyon's Lectures," Zeulzer and Oberländer, von Antal, Desnos, or the "American System of Genito-Urinary

Diseases," we find that practically tubercular cystitis may be divided into three groups of symptoms, namely, disturbances of the micturition, changes in the urine, and the physical signs.

Disturbances of the micturition are the first to appear. Gradually, without any known cause, or in a subject having some tubercular lesion, micturition becomes painful, difficult, and at last is accompanied by severe pain which lasts for a time after emptying the bladder, or may even be continuous. Pain is hardly ever wanting, and it is precisely its intensity that is a diagnostic feature of tubercular cystitis in the greater number of instances of the affection.

Under the influence of the tubercular lesions the muscles of the bladder contract and give rise to retention of urine from spasm of the vesical neck, or, on the other hand, this latter portion of the viscus is destroyed by a process of ulceration and then incontinence results.

Now, a *true* incontinence or retention of urine is not always met with in tubercular cystitis in the adult; we may have a *false* incontinence and pain, both of which are the first symptoms present, and they are always well marked.

Examination of the urine at the beginning of the affection will only reveal a clear polyuria, but pyuria soon occurs, the purulent matter being voided more particularly at the end of micturition. Hematuria, which is frequent at the onset, may be present during the entire course of the disease, but at irregular intervals and in small amount. For a time it may be absent and then suddenly recur. Search for Koch's bacillus in the urine should never be neglected, and it will often be found.

Consequently, we may say that *pain*, *hematuria* and *pyuria* are the principal symptoms of tubercular

cystitis in the adult, at least in the primary form of the affection, because in advanced cases of pulmonary tuberculosis the lesions in the bladder are often overshadowed by the poor general condition of the patient.

In children tuberculosis of the bladder does not present any such distinct array of symptoms, and usually one symptom alone indicates the presence of the disease, and for this very reason a number of cases are often not recognized.

The symptom that is the most prominent in tubercular cystitis in children is certainly incontinence of urine. But in this affection, both in adults and children, we have several kinds of incontinence, as we have above remarked. In the first place, there is a *true* incontinence, where the urine escapes without producing any desire to micturate. When present, this form of incontinence is due to a certain amount of destruction of the neck of the bladder by an ulcerative process. The breaking down of the diseased tissues destroys the prostatic region, and the urine accumulates in the cavities thus formed; from these it trickles into the membranous region, which will retain it if the urethral sphincter is still intact, but if the muscle is destroyed or paralyzed by the tubercular process the urine will escape and cannot be retained.

Tubercular inflammation may paralyze the action of the sphincter to a certain extent, especially if the muscle is congenitally weak.

A false incontinence varies in nature. Sometimes it is simply a micturition from overflow, in which case *it is not* an incontinence but is a retention, and is met with in certain painful forms of cystitis. The neck of the bladder is closed by spasm, and from this a more or less complete retention will result.

Now a real false incontinence is what is particularly seen in children, and is in reality a frequent and very

ardent desire to pass the urine. Even in adults when the desire to urinate occurs the patient may not even have the time to get to the bath-room and voids the urine in his clothes, and it can readily be understood that under these circumstances children, who are less reasonable than their elders, will micturate in bed at night and in their clothes during the day. But all the forms of incontinence may be met with in children, and in some cases the urine dribbles out drop by drop, and when the patient is asked to urinate into a glass only a small amount can be voided or even none whatever.

The escape of urine is voluntary, because the patient can be made to retain his urine in the bladder for a few minutes. It is in reality a false incontinence, the desire to urinate is present, but it is imperious and, being constantly present, the child cannot resist it.

In some instances there is nocturnal incontinence and during the day there is simply a frequent and painful desire to micturate. The bladder being irritated by the tubercles contracts frequently as soon as urine collects, but there is no paralysis of the sphincter. In no case that I have found reported has incontinence been due to a destruction of the neck of the bladder by tubercular ulcerations, as is so frequently found in adults.

The lesions are scattered, and when an abscess opens there then form small, superficial ulcerations which cannot destroy the urethral sphincter. Necropsies have clearly shown that the neck of the bladder is a favorite seat for tubercular lesions, and the same may be said of the deep urethra. When the infection of the bladder is secondary to that of the kidney the ureteral orifices will present pathologic changes, or small ulcerations will be found near them. When

there are lesions in the deep urethra spasm will result.

Incontinence from overflow may also be observed along with a more or less complete retention, this being due to spasm of the urethra. The spasm in tubercular cystitis indicates, just as it does in other forms of cystitis, that there is a severe hyperemia of the neck of the bladder, due to the presence of tubercles or ulcerations in this region of the organ.

In children, as we have said, incontinence from pollakiuria is the most prominent symptom of tubercular cystitis, but hematuria, pyuria and pain may also be present, and we will now consider, in a few words, each one of these symptoms.

Pain varies in different cases, and often is wanting, or at least appears to be, because we must be careful not to be misled on this point, for little children cannot tell us exactly what they feel. Severe pain will make them cry, while they do not pay much attention to little dull pains or burning sensation, as would the adult. It may, however, be said that pain sufficient to make the child cry is never so persistent that sleep is entirely prevented.

Hematuria appears to be an infrequent symptom in tubercular cystitis in children, and does not show itself at the beginning of the trouble as it does in adults. Pyuria, on the contrary, is important in little ones, and Guyon has insisted upon the necessity of a careful analysis of the urine, because if it contains pus the incontinence present is not due to a neurosis.

Consequently, in both children and adults, the urine in tubercular cystitis is most always purulent, but it is so in varying degrees, but in rare exceptions it may remain perfectly clear and is passed in large quantities, — a fact that may cause much difficulty in diagnosis.

In all cases of suspicious cystitis a careful bacteriological examination of the urine should be carried out. The microscope will reveal pus cells and red blood corpuscles, while chemical analysis will often show the presence of albumin due either to the pus or to lesions of the renal gland.

The search for Koch's bacillus will often be negative, but should be often repeated, and finally we can perhaps discover the organism, which when found will settle all doubts as to the nature of the affection. Inoculation of the pus contained in the urine, or the urine itself, into animals, especially the guinea-pig, should always be resorted to, and the presence of the specific bacillus may thus be demonstrated when the microscope and culture-tubes have remained negative. One inoculation is not enough, and several animals must be employed, each one receiving a different sample of the urine.

As to cystoscopic examination I would say, that in my experience tubercular ulcerations have nothing that one could call typical. They may be small or large, round or irregular in outline; their borders may be elevated; or, on the other hand, no induration will be found in their neighborhood. Their surface may be clean or covered with a secretion or by salts from the urine. Tubercles are to be found scattered along the course of the blood-vessels and are easily recognized as small pearly points, and which have been well figured by Casper of Berlin in his recent and excellent work "*Handbuch der Cystoskopie*" on Plate IV, Figure 15 (Leipzig, 1898).

It is hardly necessary for me to say that a complete examination of all the other viscera should be made, and often we will find an active or latent focus of tuberculosis in some other organ. Of course in small boys the testicle and prostate are not likely to be

invaded by the process on account of their rudimentary state of development, so that no information can probably be gathered from the condition of these organs.

Primary tuberculosis of the bladder in children is, if we may judge from reported cases of the affection, relatively good in its prognosis, and generally, with proper treatment and change of climate, the symptoms will disappear,—at any rate for quite a time. The affection remains localized, and although cases are recorded in which the lungs became involved, a tubercular cystitis has in the young a marked tendency to get well.

In childhood other tubercular lesions have this same tendency, such as coxitis, even when there is suppuration in the joint, while such a condition in an adult would be very serious. Other tubercular lesions disappear, such as abscess of the lymphatic glands, arthritis, conjunctivitis or rhinitis.

The diagnosis of tubercular cystitis in the child is not always an easy matter, and may even be overlooked. The frequent absence of pain, especially in the early stage, hematuria and the excellent general condition of the patient when the bladder is the primary seat of the infection, will mislead the physician as to the nature of the symptoms present.

Incontinence of urine in childhood being the chief, if not the only, symptom of cystitis in general and the tubercular form in particular, we should study the type of incontinence present in a given case. When a child presents an incontinence it may be the first symptom present of a general tuberculosis which will undergo its evolution at a later date, and simply indicates that there is an active focus of the tubercles in the urinary reservoir.

A repeated examination of the urine will show the

presence of a cystitis and in order to obtain a sufficient quantity the catheter may have to be employed. The urine always shows pathologic changes in tubercular cystitis, while in nocturnal incontinence due to a neurosis it is always perfectly limpid.

In tuberculosis of the bladder, both in children and adults, the urine contains a quantity of small filaments or grumous matter, which falls to the bottom of the glass after standing, forming a rather thick purulent or muco-purulent deposit. The urine above this will be found perfectly clear if the bladder alone is the seat of the disease, but when the kidney is involved in the process the entire bulk of urine will remain cloudy no matter how long it may stand. In some few instances a little blood or a few clots are to be found.

The urine will be found acid in reaction in tubercular cystitis unless some mixed infection has taken place, and the same may be said of the cystitis due to the bacterium coli, so that no differential diagnostic help can be gained, but the rapidity of growth on culture media of the latter organism will quickly put an end to any doubt as to the nature of the bladder infection.

All the symptoms above mentioned indicate that there is a cystitis present, but the nature of the lesion is often difficult to decide. Exploration of the bladder will quickly eliminate calculus or neoplasms of the organ, which frequently give rise to cystitis in young people. Neoplasms, and papillomata in particular, give rise to repeated and profuse hematuria, which appears and disappears suddenly.

The infectious origin of a chronic cystitis now remains to be discovered. The gonococcus is not apt to infect children's bladders, but the bacterium coli is certainly a potent factor of vesical inflammation in

both adults and children, more especially female subjects, and I have notes of several cases in which this organism was the cause of chronic cystitis in children.

In considering a case of cystitis in a child we should recall two diagnostic points which have much importance, namely, the absence of any distinct cause for the bladder trouble and any unusually long duration of the affection. Guyon has rightly said, "A spontaneous cystitis is about the same thing as a spontaneous bronchitis, and both should bring to mind the question of tuberculosis," and we would add that when the cystitis persists in spite of a well-directed treatment we should suspect the beginning of a tubercular process within the bladder as probable.

If lesions are found in the bladder we must next ascertain if the kidneys are not also involved, and consequently a careful palpation of the renal glands is necessary. Certain pathologic findings in the urine, such as a cloudy polyuria or renal casts, indicate that the kidney is infected.

The treatment of tubercular cystitis is general and local, but as the disease in children has a rather good prognosis when it is primary, no surgical interference is to be considered unless other milder measures prove useless.

Cod-liver oil, creosote and tonics are of value, and iodoform in the form of a pill is highly recommended by Guyon and Reverdin. Locally an iodoform or guaiacol emulsion is to be injected into the bladder and retained until expelled; theoretically they are of value, and practically have proven their excellent curative action. The ulcerations may be cauterized and curetted if they be extensive. Being aware of the favorable results obtained from local applications of lactic acid in tubercular laryngitis, we were led to ex-

periment with this agent in the bladder, and the results obtained in the case here reported would appear to indicate that further use of this substance is justifiable.

The indications for suprapubic cystotomy vary according to the end to be obtained. If it is done to bring about a radical cure it should only be performed in cases of *primary vesical tuberculosis* and then we can expect much from drainage of the bladder. The ulcerations can be directly cauterized with the thermo-cautery or even excised through the opening.

When this operation is done as a palliative treatment, — that is to say, when other foci of the disease are present and the cystitis is secondary, — the relief from pain that the patient will obtain is quite enough to justify its performance.

To sum up, we may say that a primary tubercular cystitis in children is curable when the lesions are not advanced, and that if general treatment and local applications do not show any effect on the process after a reasonable trial suprapubic cystotomy is the operation of choice, and will be followed with as good results as those obtained by it in the adult.

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